CLAIMS

1. The use of an ionic liquid, as liquid matrix for organic synthesis in homogeneous phase on soluble support, without volatile organic solvent, said ionic liquid being presented in liquid or solid form at ambient temperature, of formula $A_1^+X_1^-$, A_1^+ representing a cation, functional or non-functional, or a mixture of cations in which either none of the cations is functional or at least one of the cations is functional, and X_1^- an anion, functional or non-functional, or a mixture of anions in which either none of the anions is functional or at least one of the anions is functional.

2. The use according to claim 1, characterized in that A_1^+ represents a non-functional cation or a mixture of non-functional cations and X_1^- a non-functional anion or a mixture of non-functional anions.

3. The use according to claim 1, characterized in that

A_1^+ represents a functional cation or a mixture of cations at least one of which is functional,

and/or X_1^- represents a functional anion or a mixture of anions at least one of which is functional,

said functional cations and functional anions corresponding to an ionic entity, namely cationic or anionic respectively, linked to at least one function F_i, F_i varying from F_0 to F_n, n being an integer varying from 1 to 10.

4. The use of an ionic liquid according to one of claims 1 or 2, for the preparation of a stable composition containing in solution:

- at least said ionic liquid of formula $A_1^+X_1^-$, playing the role of liquid matrix and,
- at least one functionalized salt (salt with a dedicated task), in particular functionalized onium salt, of formula $A_2^+X_2^-$, as reaction support,

the functionalized salt, in particular the functionalized onium salt, being dissolved in the liquid matrix, in order to form a homogeneous phase,

A_1^+ representing a non-functional cation or a mixture of cations in which none of the cations is functional, and X_1^- representing a non-functional anion or a mixture of anions in which none of the anions is functional,

A_2^+ representing a cation, functional or non-functional, or a mixture of cations in which none of the cations is functional or in which at least one of the cations is functional, and X_2^- representing an anion, functional or non-functional, or a mixture of anions in which none of the anions is functional or in which at least one of the anions is functional,

provided that A_2^+ and/or X_2^- represent(s) or comprise(s) a functional cation and a functional anion respectively,

said functional cations and functional anions corresponding to an ionic entity Y-, namely cationic Y^+– or anionic Y^-– respectively, linked, optionally via an L arm, in particular an alkyl group comprising 1 to 20 carbon atoms, to at least one function F_i, F_i varying from F_0 to F_n, n being an integer varying from 1 to 10, the functional cation being representable in the form Y^+–L-F_i, and the functional anion in the form Y^-–$(L)_k$-F_i, k being equal to 0 or 1, and the functional anion possibly representing, when k is equal to 0, a single anion, corresponding to Y^-–F_i, in particular chosen from: OH^-, F^-, CN^-, RO^- or RS^-, R representing an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms.

5. The use according to claim 3, for the preparation of a stable composition containing in solution:

– at least one first part of said ionic liquid of formula $A_1^+X_1^-$,the cation and/or the anion of which correspond(s) to an ionic entity linked to one or more initial functions F_0, playing the role of liquid matrix, and

– at least one second part of said ionic liquid of formula $A_1^+X_1^-$, in which said initial function or functions F_0 are converted into first novel functions, conferring upon said second part of said ionic liquid the role of functionalized salt and of reaction support,

the functionalized salt and the liquid matrix forming a homogeneous phase,

the abovementioned first novel functions of the second part of said ionic liquid being capable of being converted subsequently into other functions, without affecting the initial function or functions F_0 of the first part of said ionic liquid.

6. The use of an ionic liquid according to claim 4, characterized in that the A_2^+ cation and/or the X_2^- anion of the functionalized salt or salts, corresponding to a Y– ionic entity linked to at least one function F_i, are immobilized in the liquid matrix and cannot be extracted from the liquid matrix by standard extraction means, in particular by solvent, and in which the function(s) F_i of the functionalized salt or salts can be converted at the end of at least one reaction resulting from the addition of at least one reagent to said composition.

7. The use of an ionic liquid according to claim 6, characterized in that several functionalized salts are immobilized.

8. The use according to one of claims 4, 6 or 7, characterized in that the A_2^+ cation is functional.

9. The use according to one of claims 4, 6 or 7, characterized in that the X_2^- anion is functional.

10. The use according to one of claims 4, 6 or 7 to 9, characterized in that A_2^+ and X_2^- are functional.

11. The use according to one of claims 1, 2, 4, 6 to 10, characterized in that:

– either the ionic liquid of formula $A_1^+X_1^-$ is solid at ambient temperature and is liquefiable within a temperature range from approximately 25°C to approximately 250°C, in particular from approximately 30°C to approximately 150°C, and the $A_2^+X_2^-$ functionalized salt is solid at ambient temperature and is soluble in the liquefied $A_1^+X_1^-$ ionic liquid, in order to form a homogeneous phase,

– or the ionic liquid of formula $A_1^+X_1^-$ is solid at ambient temperature and is liquefiable within a temperature range from approximately 25°C to approximately

250°C, in particular from approximately 30°C to approximately 150°C, and the $A_2^+X_2^-$ functionalized salt is liquid at ambient temperature, and is miscible with the liquefied $A_1^+X_1^-$ ionic liquid, in order to form a homogeneous phase,

– or the $A_1^+X_1^-$ ionic liquid is liquid at ambient temperature and the $A_2^+X_2^-$ functionalized salt is liquid at ambient temperature and miscible with the $A_1^+X_1^-$ ionic liquid, in order to form a homogeneous phase,

– or the $A_1^+X_1^-$ ionic liquid is liquid at ambient temperature and the $A_2^+X_2^-$ functionalized salt is solid at ambient temperature and is soluble or partially soluble in the $A_1^+X_1^-$ ionic liquid within a temperature range from approximately 25°C to approximately 250°C, in particular from approximately 30°C to approximately 150°C, in order to form a homogeneous phase.

12. The use according to claim 5, characterized in that:

– either the ionic liquid of formula $A_1^+X_1^-$ is liquid at ambient temperature,

– or the ionic liquid of formula $A_1^+X_1^-$ is solid at ambient temperature and is liquefiable within a temperature range from approximately 25°C to approximately 250°C, in particular from approximately 30°C to approximately 150°C.

13. The use according to one of claims 1 to 12, characterized in that the ionic liquid of formula $A_1^+X_1^-$, playing the role of liquid matrix, has a viscosity less than or equal to approximately 1500 cp (15 N.s/m^2), in particular less than approximately 500 cp (5 N.s/m^2) and preferably less than approximately 200 cp (2 N.s/m^2).

14. A stable composition containing in solution:

– at least said ionic liquid of formula $A_1^+X_1^-$, playing the role of liquid matrix and,

– at least one functionalized salt (salt with a dedicated task), in particular functionalized onium salt, of formula $A_2^+X_2^-$, as reaction support,

the functionalized salt, in particular the functionalized onium salt, being dissolved in the liquid matrix, in order to form a homogeneous phase,

A_1^+ representing a non-functional cation or a mixture of cations in which none of the cations is functional, and X_1^- representing a non-functional anion or a mixture of anions in which none of the anions is functional,

A_2^+ representing a cation, functional or non-functional, or a mixture of cations in which none of the cations is functional or in which at least one of the cations is functional, and X_2^- representing an anion, functional or non-functional, or a mixture of anions in which none of the anions is functional or in which at least one of the anions is functional,

provided that A_2^+ and/or X_2^- represent(s) or comprise(s) a functional cation and a functional anion respectively,

said functional cations and functional anions corresponding to an ionic entity Y-, namely cationic Y^+– or anionic Y^-– respectively, linked, optionally via an L arm, in particular an alkyl group comprising 1 to 20 carbon atoms, to at least one function F_i, F_i varying from F_0 to F_n, n being an integer varying from 1 to 10, the functional cation being representable in the form Y^+–L-F_i, and the functional anion in the form Y^-–$(L)_k$-F_i, k being equal to 0 or 1, and the functional anion possibly representing, when k is equal to 0, a single anion, corresponding to Y^-–F_i, in particular chosen from: OH^-, F^-, CN^-, RO^- or RS^-, R representing an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms.

15. A stable composition containing in solution:

– at least one first part of said ionic liquid of formula $A_1^+X_1^-$, the cation and/or anion of which correspond(s) to an ionic entity linked to one or more initial functions F_0, playing the role of liquid matrix, and

– at least one second part of said ionic liquid of formula $A_1^+X_1^-$, in which said initial function or functions F_0 are converted into first novel functions, conferring on said second part of said ionic liquid the role of functionalized salt and reaction support,

the functionalized salt and the liquid matrix forming a homogeneous phase,

the abovementioned first novel functions of the second part of said ionic liquid being capable of being subsequently converted to other functions, without affecting the initial function or functions F_0 of the first part of said ionic liquid.

16. The composition of claim 14, characterized in that the A_2^+ cation and/or the X_2^- anion of the functionalized salt or salts, corresponding to a Y– ionic entity linked to at least one function F_i, are immobilized in the liquid matrix and cannot be extracted from the liquid matrix by standard extraction means, in particular by solvent.

17. The composition of any one of claims 14 to 16, characterized in that the liquid matrix is non-reactive vis-à-vis the functionalized salt.

18. The composition of one of claims 14, 16 and 17, characterized in that A_2^+ is a functional cation.

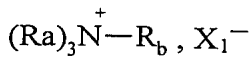
19. The composition of claim 18, characterized in that the X_1^- and X_2^- anions are identical.

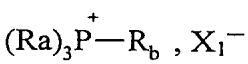
20. The composition of one of claims 18 or 19, characterized in that:

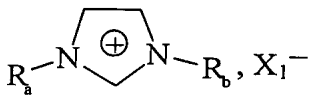
- the X_1^- and X_2^- anions are chosen from the following two families:
  - * the non-complex anions, chosen in particular from the BF_4^-, PF_6^-, $CF_3SO_3^-$, CH_3COO^-, $CF_3CO_2^-$, $^-N(SO_2CF_3)_2$ (or NTf_2^-) anions, the halides, the BR_4^-, RCO_2^- or RSO_3^- anions, R being an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms, said R group also possibly representing a perfluorinated or partially fluorinated group, or the $R'SO_4^-$ anions, R' being a hydrogen atom, a methyl group or an ethyl group;
  - * the complex anions, resulting from the combination of a Lewis acid and a halide, preferably Cl^- or F^-, of general formula MX_j, j being an integer comprised between 1 and 7, and M representing a metal, in particular chosen from aluminium, tin, zinc, bismuth, manganese, iron, copper, molybdenum, antimony, gallium or indium;
- the A_1^+ and A_2^+ cations are chosen from the onium cations, such as the substituted or non-substituted pyridinium, imidazolium, ammonium, phosphonium or sulphonium cations, , and preferably ammonium or phosphonium.

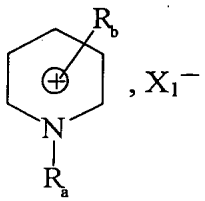
21. The composition of any one of claims 14 and 16 to 20, characterized in that the A_2^+ functional cation corresponds to a Y^+– cationic entity, linked, via an L arm, in particular an alkyl group comprising 1 to 20 carbon atoms, to a function F_0, said function F_0 being chosen from the standard functions of organic chemistry, such as the hydroxyl, carboxylic, amide, sulphone, primary amine, secondary amine, aldehyde, ketone, ethenyl, ethynyl, dienyl, ether, epoxide, phosphine (primary, secondary or tertiary), azide, imine, ketene, cumulene, heterocumulene, thiol, thioether, sulphoxide, phosphorus-containing moieties, heterocycles, sulphonic acid, silane, stannane or functional aryl functions.

22. The composition of any one of claims 14 to 21, characterized in that the ionic liquid is chosen from the following:

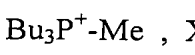


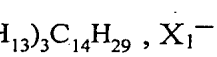


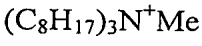




R_a and R_b representing linear or branched alkyl groups, comprising 1 to 20 carbon atoms, in particular an ethyl, propyl, butyl, pentyl, hexyl, heptyl or octyl group, or functional alkyl groups comprising 1 to 20 carbon atoms, or functional or non-functional aryl groups comprising 6 to 30 carbon atoms,

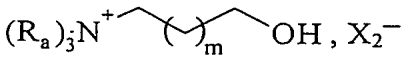


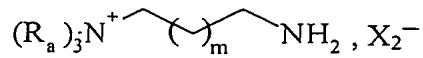


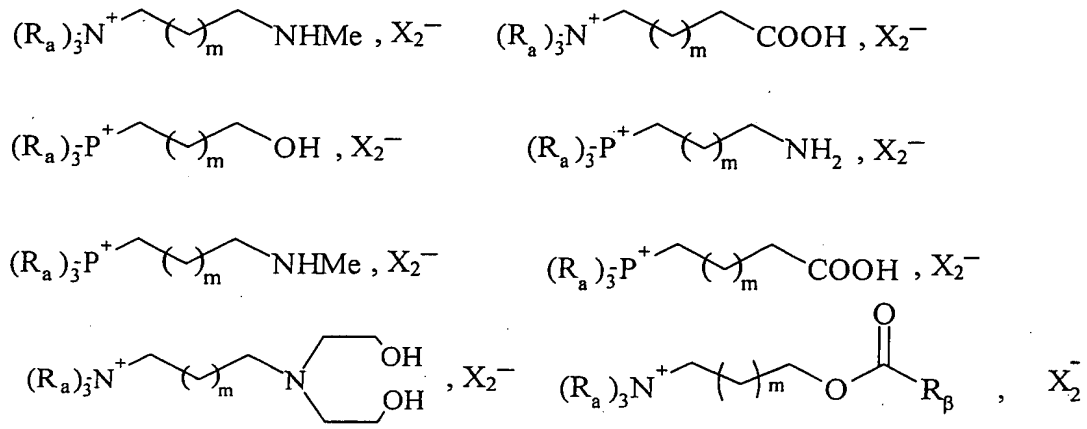


X_1^- being in particular chosen from: NTf_2^-, PF_6^-, BF_4^- or $CF_3SO_3^-$.

23. The composition of any one of claims 14 and 16 to 22, characterized in that the functionalized salt is chosen from the following:







X_2^- being chosen from: NTf_2^-, PF_6^-, BF_4^-, Cl^-, Br^-, I^-, $CF_3SO_3^-$, $MeSO_4^-$, $EtSO_4^-$, $MeSO_3^-$, $C_6H_5SO_3^-$, $pMeC_6H_4SO_3^-$,

m being an integer comprised between 0 and 20,

R_β representing a substituted or non-substituted vinyl group, functional aryl group comprising 1 to 20 carbon atoms, or functional alkyl group comprising 6 to 30 carbon atoms,

and R_a representing a branched or non-branched alkyl group comprising 1 to 20 carbon atoms, in particular an ethyl, propyl, butyl, pentyl, hexyl, heptyl or octyl group.

24. The composition of one of claims 14 and 16 to 23, characterized in that X_2^- is a functional anion, corresponding in particular to an anion the pK_A of the conjugated acid of which is less than 30, and is chosen in particular from the following anions:

OH^-, F^-, $R_cBZ_3^-$, N_3^-, CN^-, or $\bar{W}C\bar{R}_cV$

Z representing an -F, -OH, -OR group, R representing an alkyl group comprising 1 to 20 carbon atoms,

V and W representing, independently of each other, an electroattractive group, in particular a cyano, alkoxycarbonyl moiety comprising 2 to 20 carbon atoms, acyl moiety comprising 2 to 20 carbon atoms, benzoyl, alkyl sulphonyl moiety comprising 1 to 20 carbon atoms, aryl sulphonyl moiety comprising 6 to 30 carbon atoms, dialkoxyphosphonyl moiety comprising 2 to 20 carbon atoms,

R_c representing a branched or non-branched, cyclic or non-cyclic alkyl moiety, comprising 1 to 20 carbon atoms, or an aryl moiety comprising 6 to 30 carbon atoms,

and in that the A_2^+ cation is chosen from the ammonium and phosphonium cations, in particular from the following cations:

$Me_3\overset{+}{N}—R_d$ $\quad$ $Et_3\overset{+}{N}—R_d$ $\quad$ $Bu_4\overset{+}{P}—R_d$

R_d being an alkyl group comprising 1 to 20 carbon atoms.

25. The use of a composition according to any one of claims 14 to 24, for continuous, discontinuous, combinatorial, or parallel organic synthesis, and/or for the preparation of libraries of products.

26. The use of a composition according to any one of claims 14 and 16 to 25, for the implementation of a process for the preparation of a molecule G with an initial function F_0, linked, optionally via an L arm, in particular an alkyl group comprising 1 to 20 carbon atoms, to a Y^+–ionic entity, forming part of the A_2^+ cation of the $A_2^+X_2^-$, and/or Y^-– functionalized salt, forming part of the X_2^- anion of the $A_2^+X_2^-$ functionalized salt, the cation being in the form Y^+–L–F_0 and/or the anion being in the form Y^-–$(L)_k$–F_0, k being equal to 0 or 1, which process comprises the stages:

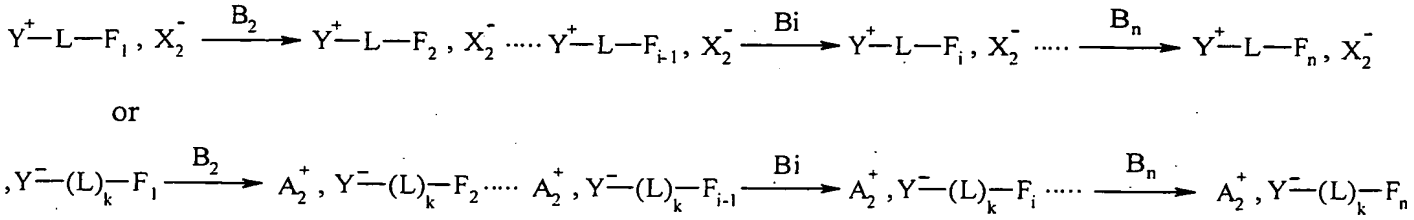
– of a first addition of a reagent B_1 into the abovementioned composition and the reaction between said function F_0, and the reagent B_1, leading to a function F_1, linked to the Y^+– ionic entity, forming part of the A_2^+ cation of the $A_2^+X_2^-$ functionalized salt, and/or to the Y^-– ionic entity, forming part of the X_2^- anion of the $A_2^+X_2^-$ functionalized salt, according to one of the following reaction diagrams:

$$Y^+—L—F_0\ ,\ X_2^- \xrightarrow{B_1} Y^+—L—F_1\ ,\ X_2^-$$

or

$$A_2^+\ ,\ Y^-—(L)_k—F_0 \xrightarrow{B_1} A_2^+\ ,\ Y^-—(L)_k—F_1$$

– of n-1 successive additions of B_i reagents, $1 < i \leq n$, n varying from 2 to 10, to the abovementioned composition, allowing, at each addition, the reaction between the reagent B_i and a function F_{i-1}, leading to the obtaining of a function F_i, the $(n-1)^{th}$ addition of the reagent B_n to the function F_{n-1} leading to the obtaining of the function F_n, the n-1 additions being representable according to one of the following reaction diagrams:



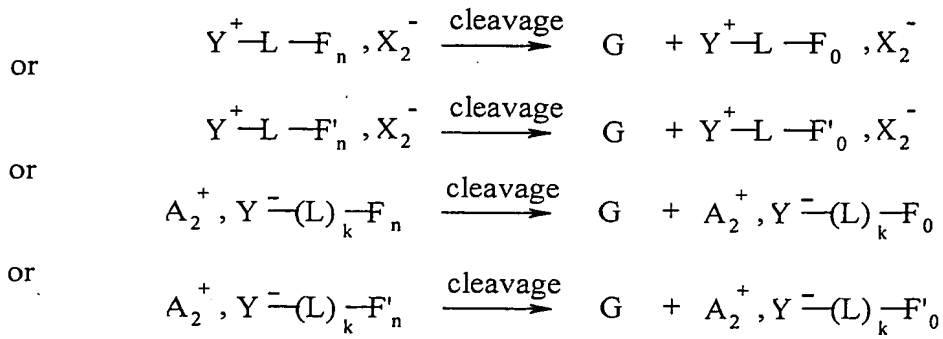
or

– of cleavage of the function F_n, linked to the Y^+– or Y^-– ionic entity respectively of the A_2^+ cation and/or of the X_2^- anion, making it possible to recover

on the one hand the $A_2^+X_2^-$ functionalized salt in the form Y^+–L–F_0, X_2^- or A_2^+, Y^-–$(L)_k$–F_0, in solution in the $A_1^+X_1^-$ ionic liquid matrix, or in the form Y^+–L–F'_0, X_2^- or A_2^+, Y^-–$(L)_k$–F'_0, in which F'_0 represents a function different from F_0,

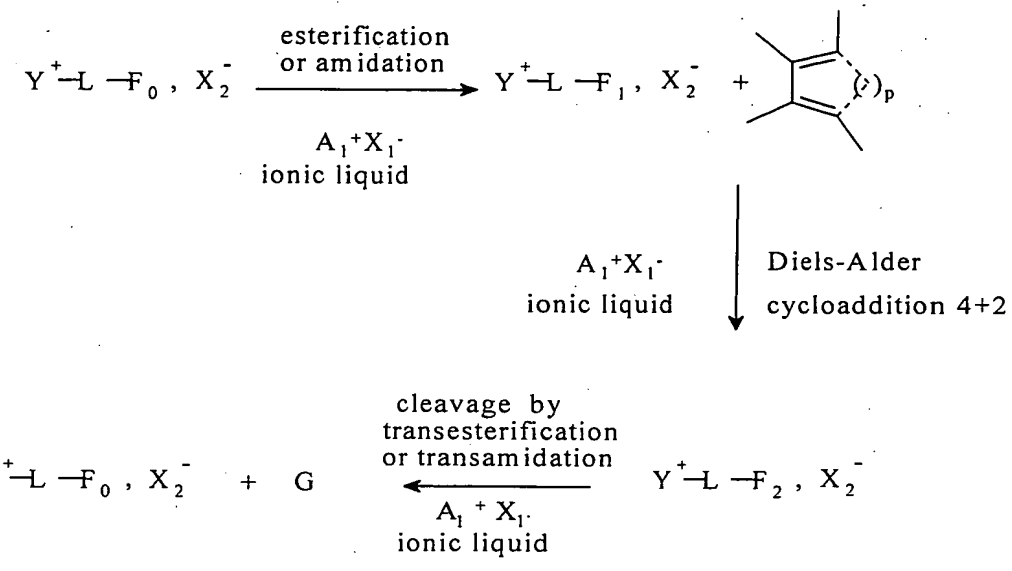
and on the other hand the molecule G,

according to one of the following reaction diagrams:



27. The use according to claim 26, for implementation of the Diels-Alder reaction, according to one of the following reaction diagrams:

a)



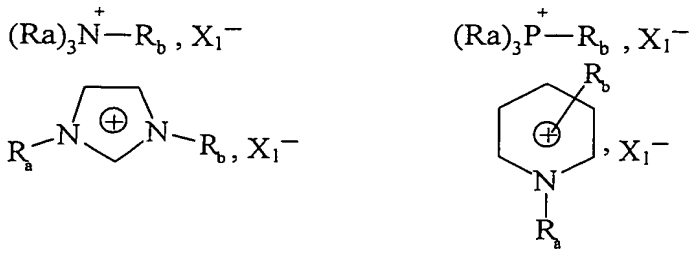
p being an integer varying from 0 to 2,

Y^+– representing an onium cation as defined in one of claims 20 to 25, and preferably being a trimethylalkylammonium, triethylalkylammonium or tributylalkylphosphonium cation,

L representing an arm, in particular a linear or branched alkyl group comprising 1 to 20 carbon atoms, or an optionally functional aralkyl group, comprising 6 to 30 carbon atoms, and preferably being a linear alkyl group preferably a linear alkyl group of (CH2)r type, r varying from 1 to 20, and preferably from 3 to 6,

X_2^- being as defined in one of claims 1 to 26, and being in particular NTf_2^-, BF_4^-, PF_6^-, Cl^-, Br^-, CH_3COO^-, $CF_3CO_2^-$, $CF_3SO_3^-$, BR_4^-, R being as defined in claim 20,

the $A_1^+X_1^-$ ionic liquid being in particular in the form:



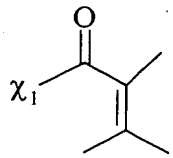
R_a and R_b being as defined in claim 22, and preferably representing alkyl groups comprising 1 to 20 carbon atoms,

X_1^- being chosen from: BF_4^-, PF_6^-, NTf_2^-, Cl^-, Br^-, CH_3COO^-, $CF_3CO_2^-$, $CF_3SO_3^-$, BR_4^-, R being as defined in claim 20,

the functions F_0, F_1 and F_2 being as defined below:

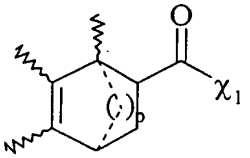
– F_0 corresponds to a $-\chi_1H$ group, in which χ_1 represents an oxygen atom or an $-NR_f$ group, R_f corresponding to a linear or branched alkyl group, comprising 1 to 20 carbon atoms, or an aryl group comprising 6 to 30 carbon atoms,

– F_1 corresponds to the following formula:



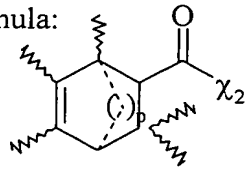
χ_1 being as defined above,

– F_2 corresponds to the following formula:

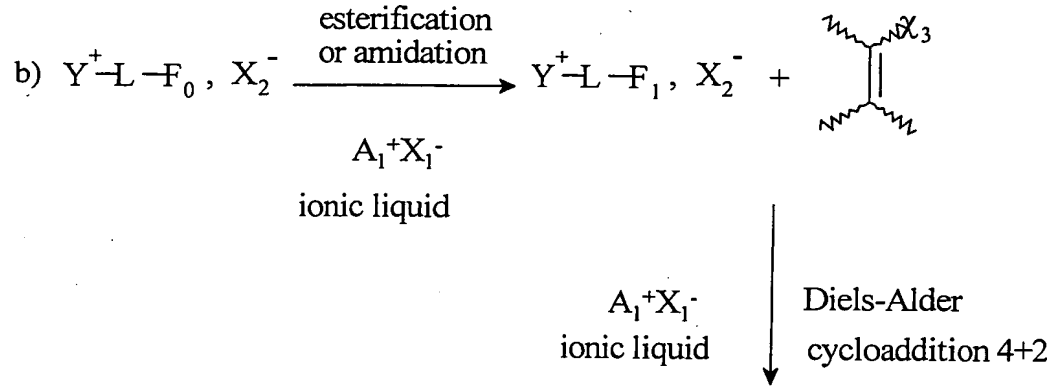


χ_1 being as defined above,

G corresponding to the following formula:



in which χ_2 represents either an OR_g group, R_g representing a hydrogen atom or an alkyl group comprising 1 to 20 carbon atoms, or an $-NR_hR_u$ group, R_h and R_u representing independently of each other a hydrogen atom, an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms,

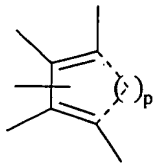


Y^+–, L, X_2^- and the $A_1^+X_1^-$ ionic liquid being as defined previously,

the functions F_0, F_1 and F_2 being as defined below:

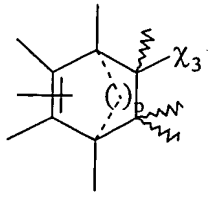
– F_0 represents any function making it possible to attach a 1,3-diene, and is in particular chosen from the carbonyl, amine, alkoxy, silane, stannane and borane functions, comprising 1 to 20 carbon atoms,

– F_1 corresponds to the following formula:



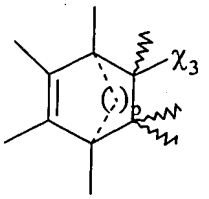
p being an integer varying from 0 to 2,

– F_2 corresponds to the following formula:



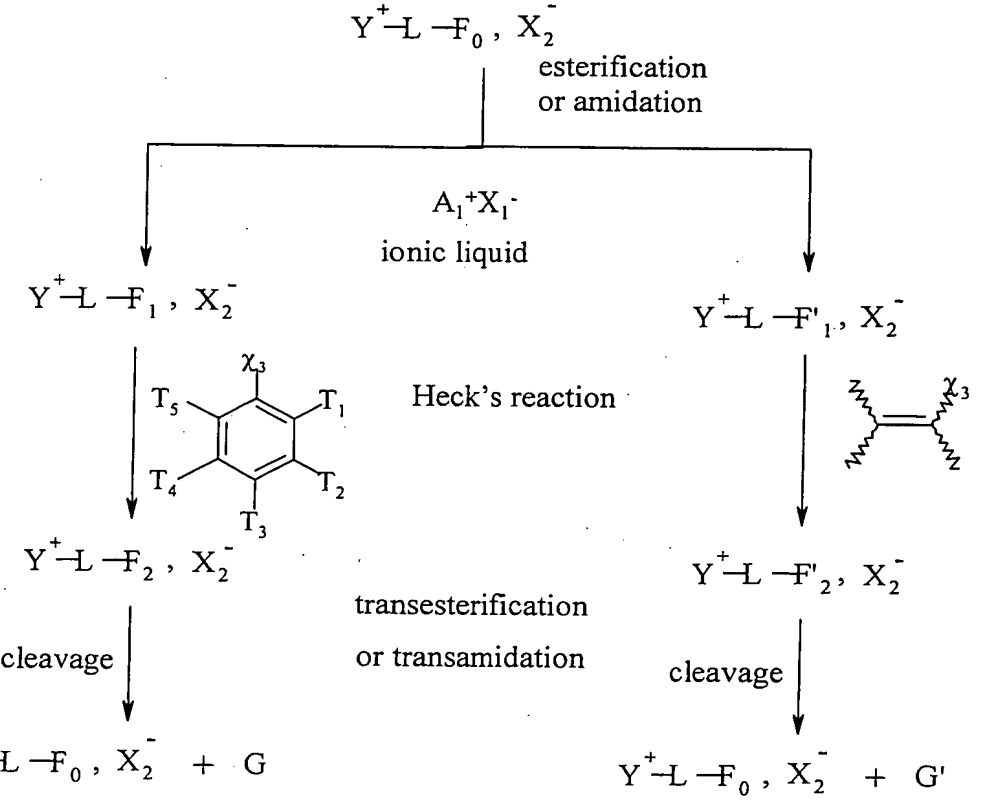
χ_3 representing an electroattractive group, in particular chosen from the cyano, alkoxycarbonyl groups, comprising 1 to 20 carbon atoms, acyl groups comprising 2 to 20 carbon atoms, benzoyl, sulphonyl, dialkoxyphosphonyl groups comprising 1 to 10 carbon atoms,

G corresponding to the following formula:



χ_3 being as defined above.

28. The use according to claim 26, for implementation of Heck's reaction, according to the following reaction diagram:

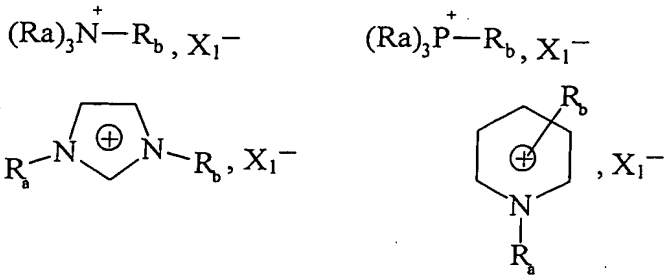


Y^+– representing an onium cation as defined in one of claims 21 to 26, and preferably being a trimethylalkylammonium, triethylalkylammonium or tributylalkylphosphonium cation,

L representing an arm, in particular a linear or branched alkyl group comprising 1 to 20 carbon atoms, or an optionally functional aralkyl group comprising 1 to 20 carbon atoms, and preferably being a linear alkyl group preferably a linear alkyl group of $(CH_2)_r$ type, r varying from 1 to 20, and preferably from 3 to 6,

X_2^- being as defined in one of claims 1 to 26, and being in particular BF_4^-, PF_6^-, NTf_2^-, $CF_3SO_3^-$, Cl^-, Br^-, or I^-,

the $A_1^+X_1^-$ ionic liquid being in particular in the form:



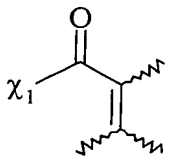
R_a and R_b being as defined in claim 22, and preferably representing alkyl groups comprising 1 to 20 carbon atoms,

X_1^- being chosen from: BF_4^-, PF_6^-, NTf_2^-, Cl^-, Br^-, CH_3COO^-, $CF_3CO_2^-$, $CF_3SO_3^-$, BR_4^-, R being as defined in claim 20,

the functions F_0, F_1, F'_1, F_2 and F'_2 being as defined below:

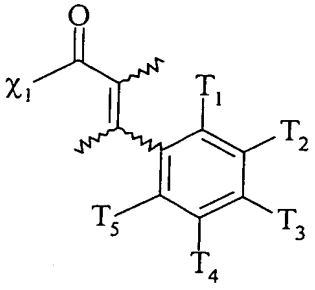
- F_0 corresponds to a $-\chi_1 H$ group, in which χ_1 represents an oxygen atom or an $-NR_f$ group, R_f corresponding to a linear or branched alkyl group, comprising 1 to 20 carbon atoms, or an aryl group comprising 6 to 30 carbon atoms,

- F_1 corresponds to the following formula:



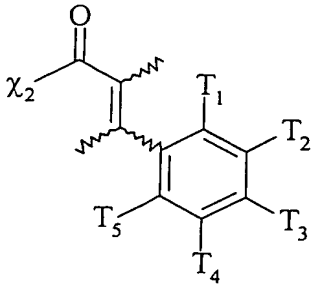
χ_1 being as defined above,

- F_2 corresponds to the following formula:



χ_1 being as defined above,

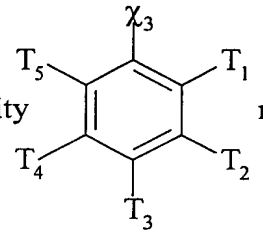
G corresponding to the following formula:

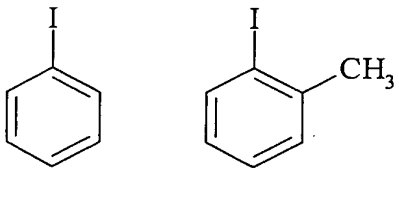


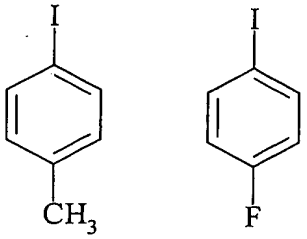
in which χ_2 represents either an -OR_g group, R_g representing a hydrogen atom or an alkyl group comprising 1 to 20 carbon atoms, or an -NR_hR_u group, R_h and R_u representing independently of each other a hydrogen atom, an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms,

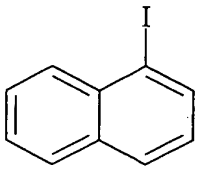
χ_3 representing a leaving moiety, in particular chosen from the halides I, Cl and Br, the mesylate, tosylate, triflate, sulphonate, sulphate or phosphate groups,

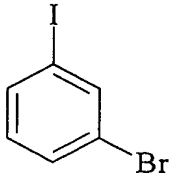
T_1, T_2, T_3, T_4 and T_5 representing independently of one another a hydrogen atom, a linear or branched alkyl group, comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms, or a functional group in particular chosen from NO_2, CN, COOR, OR, COR, NHCOR, NRR'', SO_2R, I, Br, R and R'' representing independently of each other an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms,

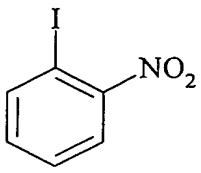
the entity  representing in particular the following groups:

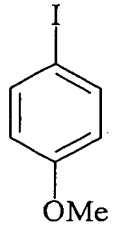


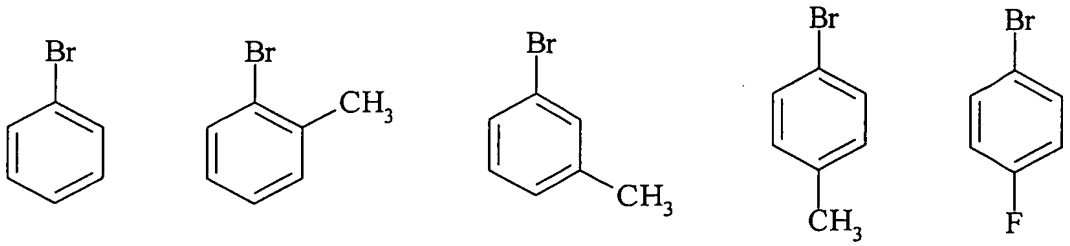


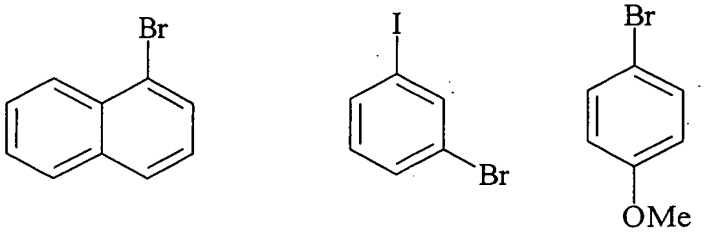




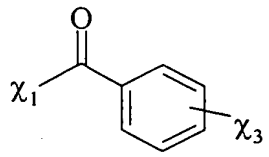






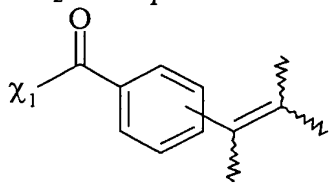


– F'_1 corresponds to the following formula:



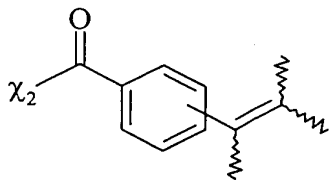
χ_1 and χ_3 being as defined above,

– F'_2 corresponds to the following formula:



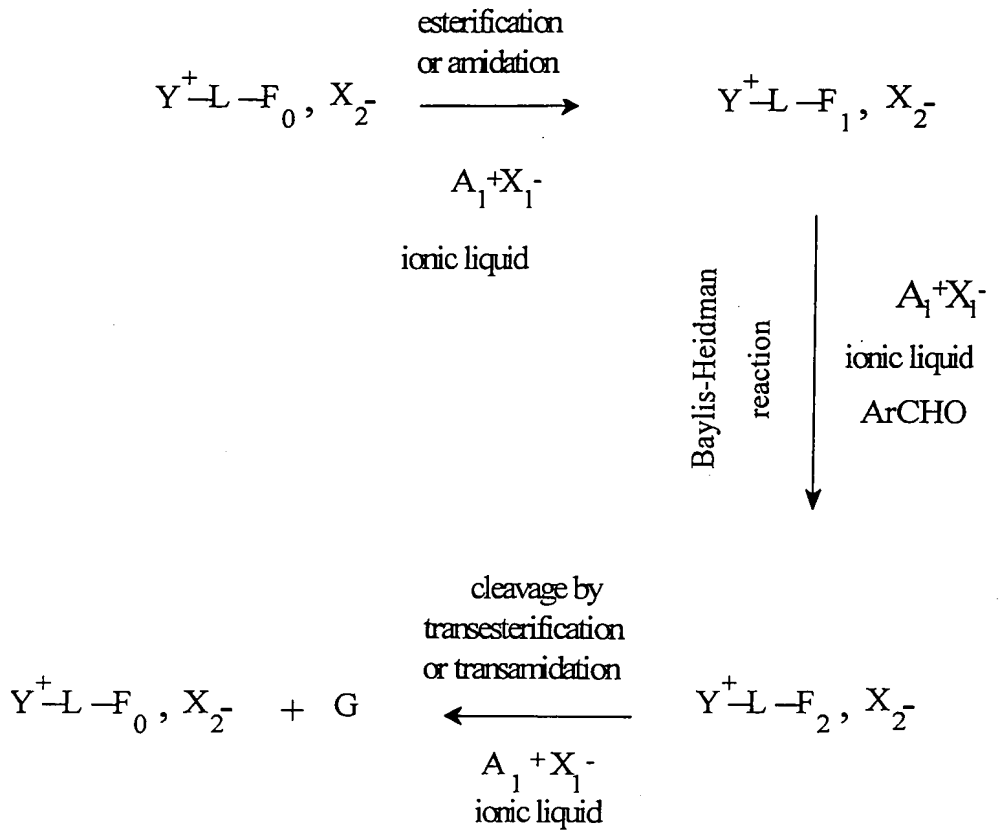
χ_1 being as defined above,

G' corresponding to the following formula:



χ_2 being as defined above.

29. The use according to claim 26, for implementation of the Baylis-Hillman reaction, according to the following reaction diagram:



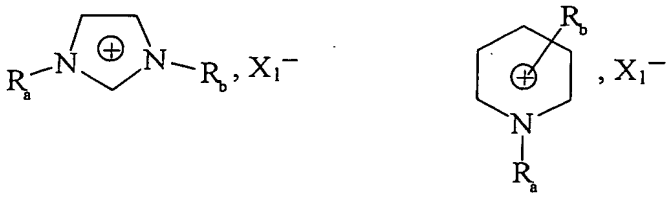
Y^+- representing an onium cation as defined in one of claims 21 to 26, and preferably being a trimethylalkylammonium, triethylalkylammonium or tributylalkylphosphonium cation,

L representing an arm, in particular a linear or branched alkyl group comprising 1 to 20 carbon atoms, or an optionally functional aralkyl group, comprising 6 to 30 carbon atoms, and preferably being a linear alkyl group preferably a linear alkyl group of $(CH_2)_r$ type, r varying from 1 to 20, and preferably from 3 to 6,

X_2^- being as defined in one of claims 1 to 26, and being in particular BF_4^-, PF_6^-, NTf_2^-, $CF_3SO_3^-$, Cl^-, Br^-, I^-, $CH_3CO_2^-$ or $CF_3CO_2^-$,

the $A_1^+X_1^-$ ionic liquid being in particular in the form:

$(Ra)_3\overset{+}{N}-R_b$, X_1^- $(Ra)_3\overset{+}{P}-R_b$, X_1^-

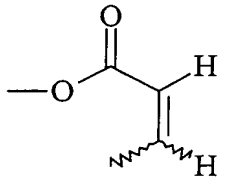


R_a and R_b being as defined in claim 22, and preferably representing alkyl groups comprising 1 to 20 carbon atoms,

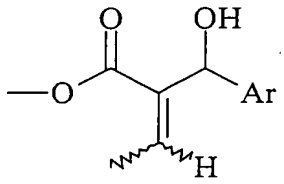
X_1^- being chosen from: BF_4^-, PF_6^-, NTf_2^-, Cl^-, Br^-, CH_3COO^-, $CF_3CO_2^-$, $CF_3SO_3^-$, BR_4^-, R being as defined in claim 20,

the functions F_0, F_1 and F_2 being as defined below:

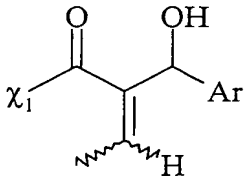
- F_0 represents an -OH group,
- F_1 corresponds to the following formula:



- F_2 corresponds to the following formula:



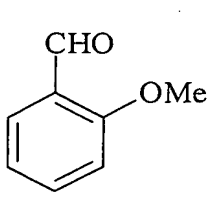
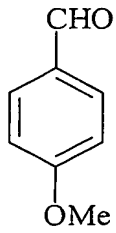
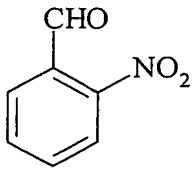
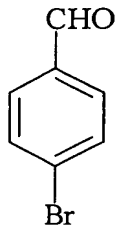
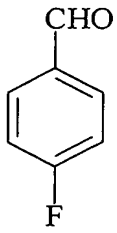
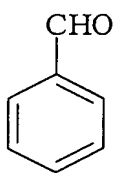
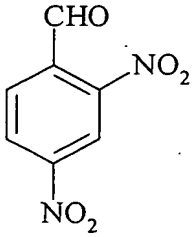
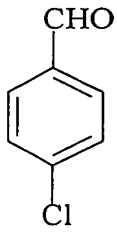
G corresponding to the following formula:



χ_1 representing an -OH group, or an $-OR_g$ group, R_g representing a linear or branched alkyl group, comprising 1 to 20 carbon atoms,

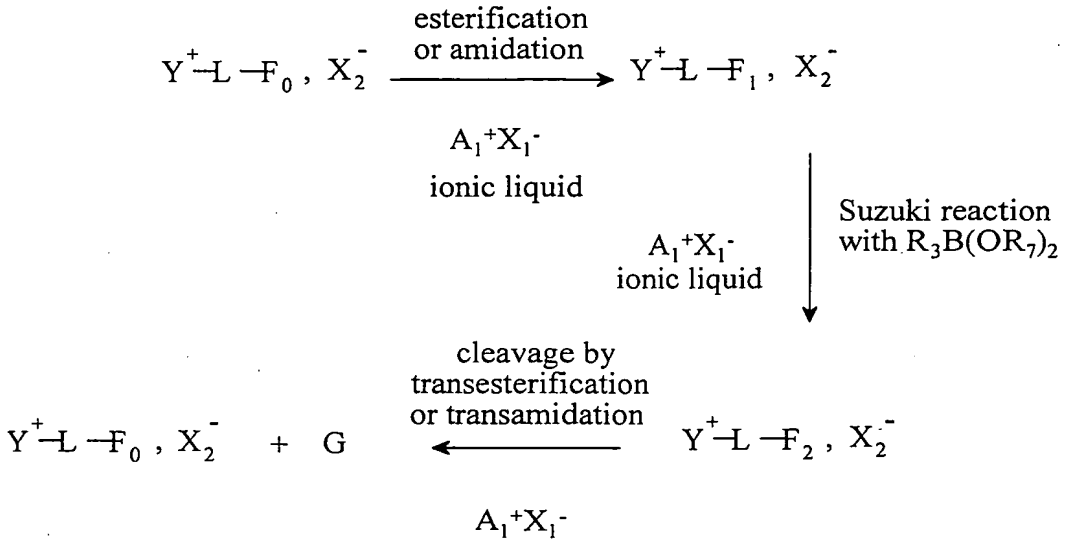
Ar representing a substituted or non-substituted, aromatic or heteroaromatic group,

ArCHO being in particular chosen from:

30. The use according to claim 26, for implementation of Suzuki coupling, according to one of the following reaction diagrams:

a)



R_3 being chosen from the substituted or non-substituted aryl, heteroaryl, ethenyl, dienyl, allyl, ethynyl groups, comprising 2 to 30 carbon atoms,

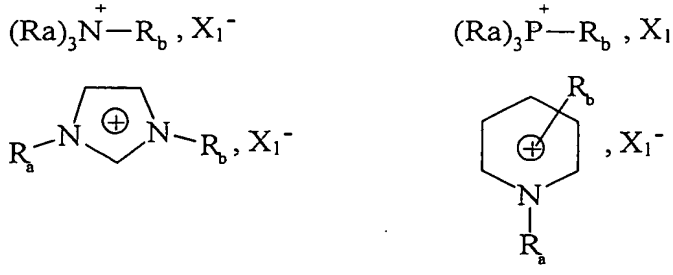
R_7 represents a branched or linear alkyl group or a cycloalkyl group comprising 1 to 12 carbon atoms,

Y^+– representing an onium cation as defined in one of claims 21 to 26, and preferably being a trimethylalkylammonium, triethylalkylammonium or tributylalkylphosphonium cation,

L representing an arm, in particular a linear or branched alkyl group comprising 1 to 20 carbon atoms, or an optionally functional aralkyl group comprising 6 to 30 carbon atoms, and preferably being a linear alkyl group preferably a linear alkyl group of $(CH_2)_r$ type, r varying from 1 to 20, and preferably from 3 to 6,

X_2^- being as defined in one of claims 1 to 26, and being in particular NTf_2^-, BF_4^-, PF_6^-, Cl^-, Br^-, CH_3COO^-, $CF_3CO_2^-$, $CF_3SO_3^-$, BR_4^-, R being as defined in claim 20,

the $A_1^+X_1^-$ ionic liquid being in particular in the form:



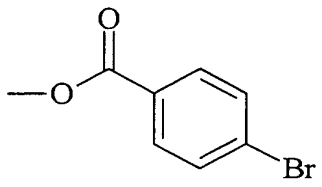
R_a and R_b being as defined in claim 22, and preferably representing alkyl groups comprising 1 to 20 carbon atoms,

X_1^- being chosen from: BF_4^-, PF_6^-, NTf_2^-, Cl^-, Br^-, CH_3COO^-, $CF_3CO_2^-$, $CF_3SO_3^-$, BR_4^-, R being as defined in claim 20,

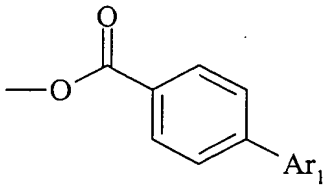
the functions F_0, F_1 and F_2 being as defined below:

– F_0 is in the form $-\chi_1 H$, χ_1 representing an oxygen atom or an $-NR_f$ group, R_f corresponding to a linear or branched alkyl group, comprising 1 to 20 carbon atoms, or an aryl group comprising 6 to 30 carbon atoms,

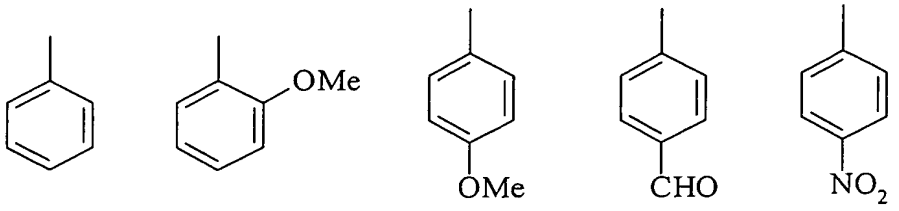
– F_1 is in the form $-R_e-\chi$, R_e representing an aromatic or heteroaromatic group comprising 6 to 30 carbon atoms, χ representing a leaving group preferably chosen from Cl, Br, I, OTf, $O\text{-}CO_2R^5$ or $OSO_3\text{-}R^5$, R^5 representing an alkyl group comprising 1 to 10 carbon atoms or an aralkyl group comprising 6 to 30 carbon atoms, F_1 preferably corresponding to the following formula:

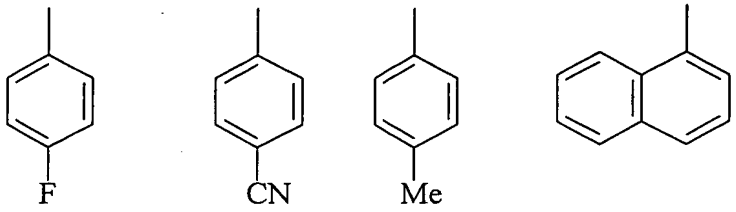


– F_2 is in the form $-R_e-R_2$, R_e being as defined above and R_2 being chosen from the substituted or non-substituted aryl, heteroaryl, ethenyl, dienyl, allyl, ethynyl groups, comprising 2 to 30 carbon atoms, F_2 preferably corresponding to the following formula:

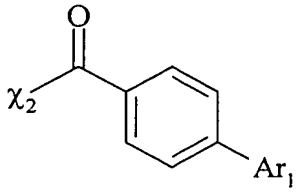


Ar_1 representing an aromatic group preferably chosen from:





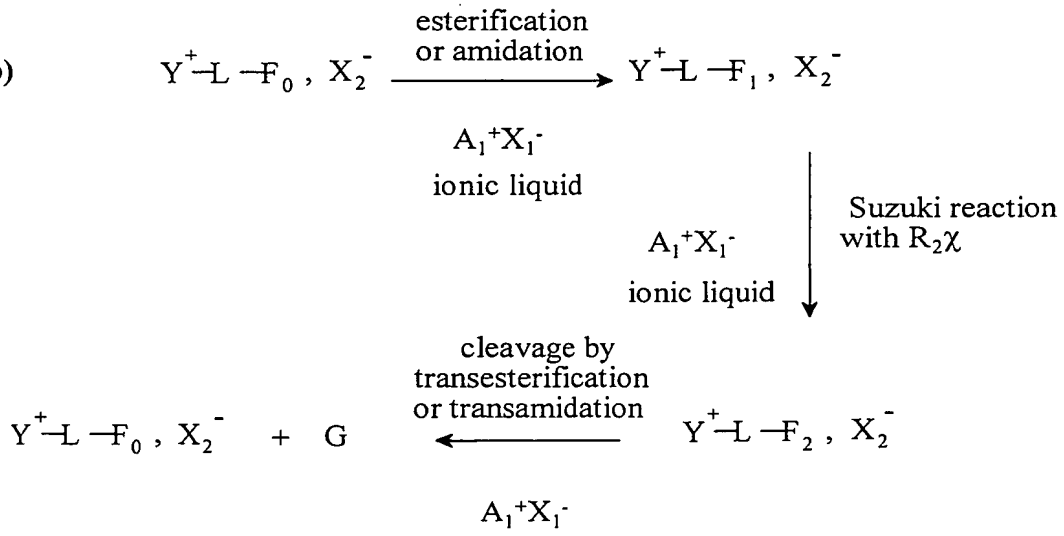
the G molecule being in the form R_2–R_3, R_2 and R_3 being as defined above, and corresponds in particular to the following formula:



in which χ_2 represents either an -OR_g group, R_g representing a hydrogen atom or an alkyl group comprising 1 to 20 carbon atoms, i.e. an -NR_hR_u group, R_h and R_u representing independently of each other a hydrogen atom, an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms,

Ar_1 is as defined above,

b)



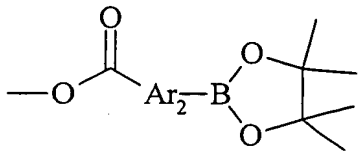
Y^+–, L, X_2^-, $A_1^+X_1^-$ and R_2 being as defined above,

the functions F_0, F_1 and F_2 being as defined below:

– F_0 is in the form $-\chi_1H$, χ_1 being as defined above,

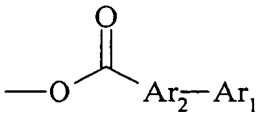
– F_1 is in the form $-R_q-B(OR_7)_2$, R_7 being as defined above, and R_q corresponding to an aryl group comprising 6 to 30 carbon atoms, heteroaryl group comprising 4 to 20 carbon atoms, ethenyl group comprising 2 to 20 carbon atoms,

dienyl group comprising 3 to 20 carbon atoms, allyl group comprising 3 to 20 carbon atoms, ethynyl group comprising 2 to 20 carbon atoms, substituted or non-substituted, F_1 preferably corresponding to the following formula:

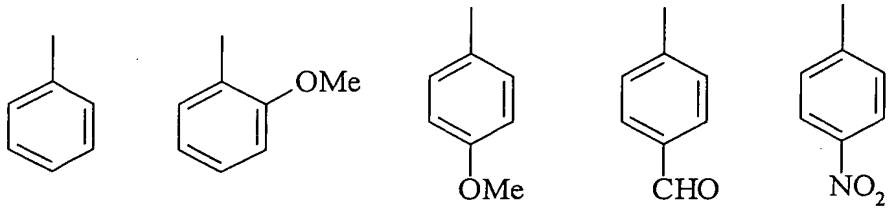


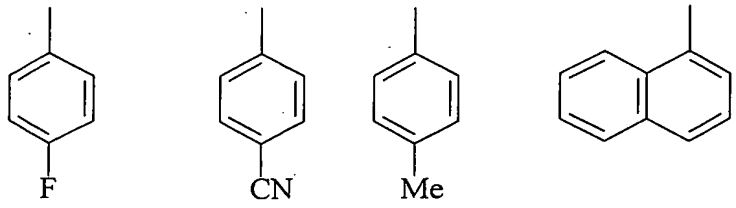
Ar_2 corresponding to a substituted or non-substituted aryl group comprising 6 to 30 carbon atoms,

– F_2 is in the form $–R_q–R_e$, R_q and R_e being as defined above, F_2 preferably corresponding to the following formula:

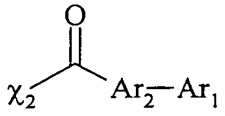


Ar_1 representing an aromatic group preferably chosen from:



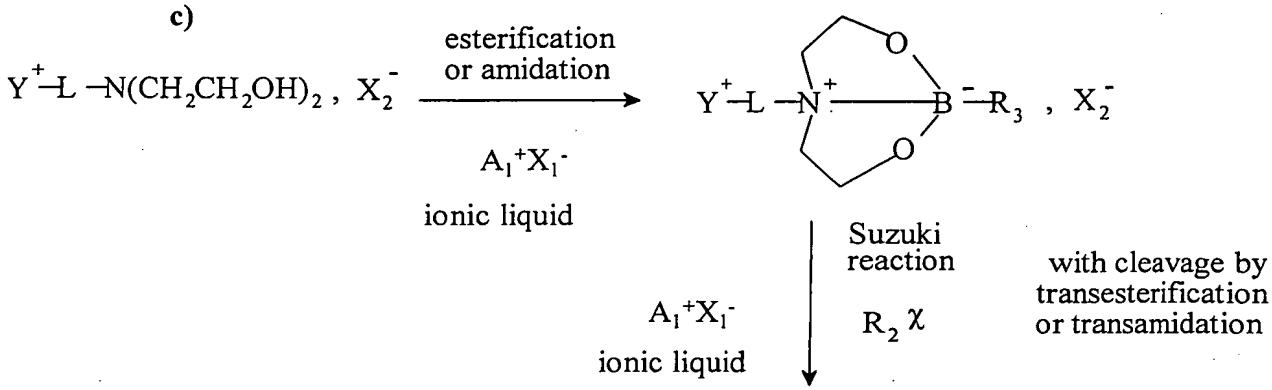


the G molecule being in the form $R_2–R_3$, R_2 and R_3 being as defined above, and corresponding in particular to the following formula:



in which χ_2, Ar_1 and Ar_2 are as defined above,

c)

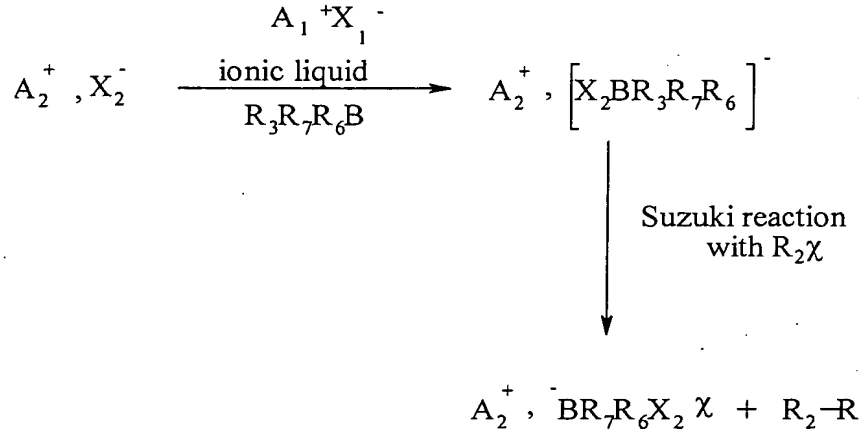


$$Y^+\text{–}L\text{–}N(CH_2CH_2OH)_2\ ,\ X_2^- \quad + R_2\text{–}R_3$$

Y^+–, L, X_2^-, $A_1^+X_1^-$, R_2 and R_3 being as defined above,

R_3 preferably being a phenyl group,

d)



$$A_2^+\ ,\ {}^-BR_7R_6X_2\ \chi\ +\ R_2\text{–}R_3$$

A_2^+ being an $(R_a)_3N^+R_b$ ammonium or $(R_a)_3P^+R_b$ phosphonium cation, preferably tetrabutylammonium and tetramethylammonium, R_a and R_b being as defined above,

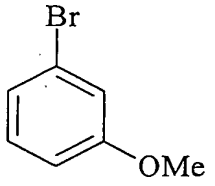
X_2^- being in particular chosen from OH^-, F^-, CN^-, R_sO^-, R_sS^-, preferably OH^- or F^-, R_s representing an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms,

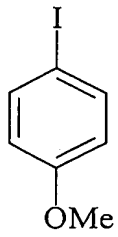
R_3 and R_4 being as defined above,

R_6 and R_7 representing independently of each other an alkyl group comprising 1 to 20 carbon atoms or an aryl group comprising 6 to 30 carbon atoms,

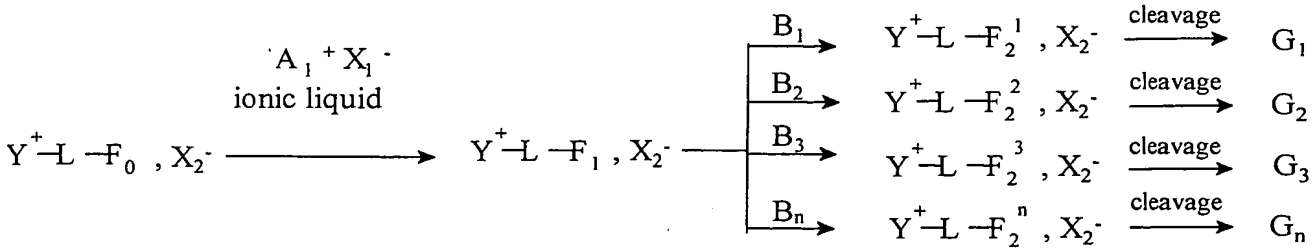
the boronic molecule of formula $R_3R_7R_6B$ being a trialkyl or aryl borane, the alkyl group comprising 1 to 20 carbon atoms and the aryl group comprising 6 to 30 carbon atoms, a boronic acid or ester, preferably a boronic acid or ester chosen as being phenyl boronic acid,

R_2 and χ are as defined previously, $R_2\chi$ preferably corresponding to an aryl halide chosen from:



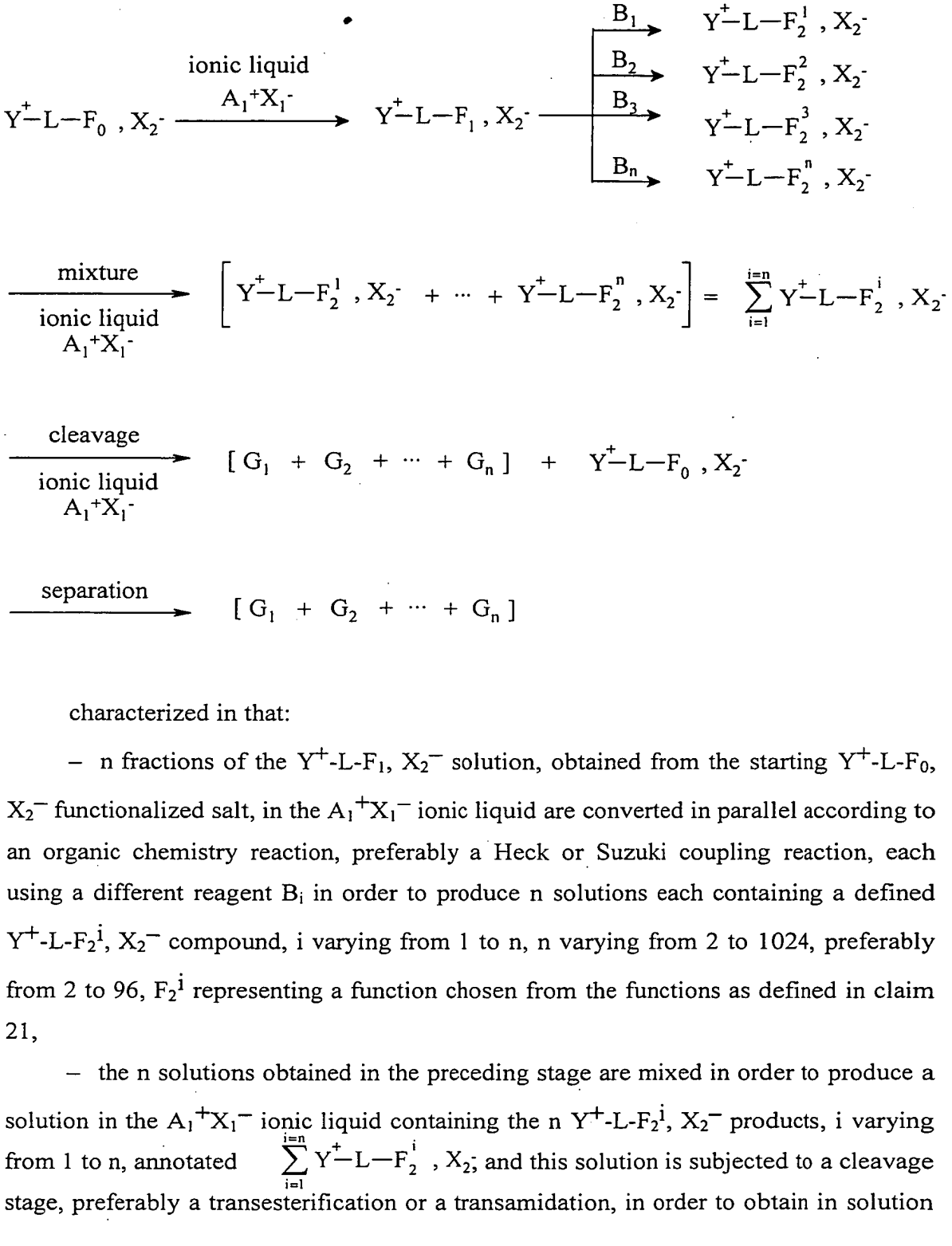


31. The use according to claims 1 to 30 for the synthesis of molecule libraries according to the parallel synthesis technique, according to the following diagram:



characterized in that the Y^+-L-F_1, X_2^- functionalized salt in the A_1^+, X_1^- ionic liquid is separated into n approximately equal parts, n varying from 2 to 1024, and in that each of these parts is then converted according to an organic synthesis reaction, preferably a Heck or Suzuki coupling reaction, each using a different reagent B_i in order to produce n solutions each containing a defined Y^+-L-F_2^i, X_2^- compound, F_2^i representing a function chosen from the functions as defined in claim 21, i varying from 1 to n, each solution being treated in order to release the G_i molecules, i varying from 1 to n, which are each isolated and purified, constituting a molecule library.

32. The use according to claims 1 to 30, for implementation of the synthesis of molecule libraries by the split-and-mix technique according to the following diagram:



characterized in that:

– n fractions of the Y^+-L-F_1, X_2^- solution, obtained from the starting Y^+-L-F_0, X_2^- functionalized salt, in the $A_1^+X_1^-$ ionic liquid are converted in parallel according to an organic chemistry reaction, preferably a Heck or Suzuki coupling reaction, each using a different reagent B_i in order to produce n solutions each containing a defined Y^+-L-F_2^i, X_2^- compound, i varying from 1 to n, n varying from 2 to 1024, preferably from 2 to 96, F_2^i representing a function chosen from the functions as defined in claim 21,

– the n solutions obtained in the preceding stage are mixed in order to produce a solution in the $A_1^+X_1^-$ ionic liquid containing the n Y^+-L-F_2^i, X_2^- products, i varying from 1 to n, annotated $\sum_{i=1}^{i=n} Y^+-L-F_2^i , X_2^-$; and this solution is subjected to a cleavage stage, preferably a transesterification or a transamidation, in order to obtain in solution

in the $A_1^+X_1^-$ ionic liquid, a mixture of the n G_i molecules, i varying from 1 to n, and the starting Y^+-L-F_0, X_2^- functionalized salt,

– the mixture as obtained in the preceding stage is separated from the $A_1^+X_1^-$ ionic liquid and from the starting Y^+-L-F_0, X_2^- functionalized salt by the usual separation methods, preferably by vacuum distillation, by extraction with a standard solvent such as heptane or toluene followed by evaporation of the solvent, by chromatography on a column, plates or under pressure, in order to obtain a library containing n G_i molecules,

this sequence of stages mentioned above being possibly repeated j times, j being comprised between 2 and 10, in order to obtain j different libraries of n products.